
Antithrombogenic modification of small-diameter microfibrinous vascular grafts.

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Public Summary:

Scientific Abstract:

OBJECTIVE: To develop small-diameter vascular grafts with a microstructure similar to native matrix fibers and with chemically modified microfibers to prevent thrombosis. METHODS AND RESULTS: Microfibrinous vascular grafts (1-mm internal diameter) were fabricated by electrospinning, and hirudin was conjugated to the poly (L-lactic acid) microfibers through an intermediate linker of poly(ethylene glycol). The modified microfibrinous vascular grafts were able to reduce platelet adhesion/aggregation onto microfibrinous scaffolds, and immobilized hirudin suppressed thrombin activity that may interact with the scaffolds. This 2-pronged approach to modify microfibrinous vascular graft showed significantly improved patency (from 50% to 83%) and facilitated endothelialization, and the microfibrinous structure of the vascular grafts allowed efficient graft remodeling and integration, with the improvement of mechanical property (elastic modulus) from 3.5 to 11.1 MPa after 6 months of implantation. CONCLUSIONS: Microfibrinous vascular grafts with antithrombogenic microfibers can be used as small-diameter grafts, with excellent patency and remodeling capability.

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